Biology 305: Genetics

Location: CL 112 Tuesday & Thursday 11:30-12:45

This course examines the nature of DNA, genes, and molecular genetics in prokaryotic, eukaryotic, and viral systems. There will be an emphasis on current molecular techniques and emerging insights into gene functions and genome organization.

We respectfully acknowledge that the University of Regina is situated on the territories of the nêhiyawak, Anihšināpēk, Dakota, Lakota, and Nakoda, and the homeland of the Métis Nation. These are also the homelands of the plains bison (*Bison bison bison*) and the meadowlark (*Sturnella neglecta*), among countless other animals, plants, and microbes with whom we share the land. The Regina campus is located on Treaty 4 lands.

Instructors: Dr. Andrew Cameron (he/him) - Lecture
Office: RIC 323
Email: andrew.cameron@uregina.ca
Office hours: By arrangement, scheduled by email, phone, or in person at lecture.

Dr. Jennifer Russell (she/her) - Lab
Contact: UR Courses

Online Resources: A UR Courses site will be continually updated with course materials and will host a discussion forum. Login at https://urcourses.uregina.ca/login/index.php using your uregina.ca username and password.

Textbook: There is no required textbook for this course. As we progress through the semester, reading materials will be assigned from open source, free online textbooks and from primary literature.

Lab: Labs will be held in-person, biweekly, in LB 428

Evaluation:

Laboratory section	40 % (see lab-specific syllabus for grading details)
Exam 1 (**September 30**)	15 %
Exam 2 (**October 30**)	17.5 %
Final Exam (**December 16**)	27.5 %

Final exam: Tuesday December 16. The exam will be written in the regular classroom, CL 112, 14:00-17:00 (2:00 - 5:00 pm).

Accommodations: Students in this course who have need for specialized accommodations should please contact the Centre for Student Accessibility (https://www.uregina.ca/student/accessibility/centre-Accessibility/index.html).

Policies and Procedures

1. The information provided about laboratory exercises should be studied carefully before coming to each lab.
2. There are no make-up midterm exams. Marks for the missed mid-term exam will be reallocated over the remainder of the exams in the course. Students who miss either of the two midterm exams must provide a valid excuse with documentation.
3. The final exam must be written to complete the course. The final exam covers the entire course.
4. "Deferred" final exams can only be granted to Faculty of Science students by the Assistant Dean, Academic. Non-Science students require approval from the Dean and/or Assistant Dean of their Faculty or Federated College. Deferred final exams cannot be granted by the course instructors.
5. A passing grade is 50% in the overall course (calculated from all items indicated under Evaluation on page 1).
6. The course grade is calculated using the same graded components and a common rubric for all students. Therefore, grades of individual students cannot be arbitrarily changed by the instructor.
    - Grade appeals: students have 20 business days from the day they receive a grade to initiate an appeal.
7. Please note that this course falls under the Academic Regulations of the University of Regina and the Faculty of Science. The regulations are printed in the General Calendar, available at https://www.uregina.ca/student/registrar/resources-for-students/academic-calendars-and-schedule/undergraduate-calendar/sections.html).

Pre-requisites

Prerequisite: BIOL 205 and CHEM 140, and one of BIOL 288 or BIOC 220

Course topics include:

- What is a gene?
- Genetic signatures and mechanisms of evolution
- Genetic diseases in humans (and other animals)
- DNA structure; DNA modifying enzymes
- Mutations
- DNA sequencing methods & Genome assembly
- Gene and genome architecture
- Clustered regularly interspaced short palindromic repeats (CRISPR)
- Selfish genetic elements, including transposable elements, restriction enzymes, and plasmids
- Regulation of gene expression; Gene networks; Transcription factors
- Prokaryotic genetic systems, including mechanisms of horizontal gene transfer
- Eukaryotic genetic systems
- Viral genetic systems

Examples and mechanisms will be integrated into lectures as appropriate.

BIOL 305 – GENETICS
Fall 2025 Lab Syllabus and Schedule

Territorial acknowledgement: The University of Regina is situated on the territories of the nêhiyawak, Anihšināpēk, Dakota, Lakota, and Nakoda, and the homeland of the Métis/Michif Nation. The Regina campus is on Treaty 4 lands, and Saskatoon classes are on Treaty 6 lands.

Lab Instructor: Dr. Jennifer Russell (she/her)
Contact: URCourses
Office: LB 414.4

Labs: Labs will be held in-person, biweekly, in LB 428.

Office Hours:
Friday: 9:00-11:00 AM
Subject to change

Lab Description: In this lab you will perform a semester-long experiment to clone a target gene into a plasmid and then transform that plasmid into a bacterial host.

Learning Objectives:
1) To understand basic concepts related to molecular biology and genetic cloning
2) To further develop wet lab skills
3) To develop skills in bioinformatics analyses
4) To develop skills in scientific writing

Lab Materials:

Notebook: You are required to purchase a bound notebook for lab work. Notebooks that allow for the addition/removal of new pages will not be accepted. You are free to use old lab notebooks from previous labs, provided that you have adequate space for the new content.

Lab Manual: The lab manual and all lab content is available on URCourses.

PPE: Please bring your own lab coat to the lab. Lab coats can be purchased from URStores (in RIC). Safety glasses are also required for this lab. Lab coats should be kept in a plastic bag that is only opened INSIDE the lab!

Other Requirements: Please bring a pen (not a pencil) to write with.

Late Assignments Policy: Please see the relevant assignment documents for information regarding late penalties.

Assignment Extension Policy: I understand that things can happen, and so I will be flexible with assignment dates. However, if you require an extension, I do ask that you contact me, at minimum, 48 hours prior to the due date. If you contact me less than 48 hours before the due

date, I may choose not to accommodate late assignments. **There will be no extensions given for pre-lab quizzes or notebook checks.**

Attendance Policy: Lab attendance is mandatory, and you will not be allowed to complete the course if you have missed any lab sessions without valid reason. In addition, it is imperative that you arrive on time; arriving late may subject you to late penalties. Please contact Dr. Russell if you are not able to make it to your lab session, or if you think you might be late. **If you contact me during/after your scheduled lab session you may be subject to late attendance penalties.**

Grading: The lab is worth 40 % of your total grade

Please Note: this breakdown is subject to change with agreement from students

Notebooks: 6.0 %

-Formal notebook checks will be done twice throughout the semester

Lab Quizzes: 8.0 %

-There will be four quizzes (2.0 % each)

Project Proposal: 21 %

-Topic Hand-in: 1.0 %

-Peer review: 5.0 %

-Final Version: 15 %

Bioinformatics Assignment: 2.0 %

Engagement: 3.0 %

Lab Schedule: All dates and topics are subject to change, as necessitated by illness, closures, or other unforeseen circumstances.

Date	Lab Topic/Activity
September 8th-10th	PCR and Plasmid Mini-Prep
September 22nd-24th	PCR Clean-Up and Gel Electrophoresis
October 6th-8th	Restriction Enzyme Digest and Ligation
October 20th-22nd	Transformation and Plating
November 3rd-4th	Plate Counts
November 17th-19th	Data Analysis Lab

Lab Quiz Due Dates: I reserve the right to change due dates if necessary, but I will never move a due date to be earlier in the semester. There will be no extensions given for quizzes. **With the exception of Quiz 1, quizzes will always close at 2:00 PM on the Monday the week before your lab.**

Quiz	Quiz Opens on URCourses	Due Date
1	September 2nd	September 8th @ 2:00 PM
2	September 9th	October 6th @ 2:00 PM
3	October 3rd	October 20th @ 2:00 PM
4	October 31st	November 17th @ 2:00 PM

Assignment Due Dates: I reserve the right to change due dates if necessary, but I will never move a due date to be earlier in the semester.

Due Date	Assignment
Oct. 2nd	Topic for Project Proposal Due
Oct. 6th/7th	First Notebook Check (Leave notebooks behind during Lab 3)
Oct. 15th	Project Proposal Rough Draft Due for Peer Review
October 23rd @ 11:59 PM	Lab 3 Bioinformatics Assignment. **Late submissions will not be accepted.**
Oct. 29th	Peer Review of Project Proposal Due
Nov. 25th	Project Proposal Due
Nov 28th @ 1:00 PM	Final Notebook Check - Notebooks are due by 1:00 PM in the drop box outside of the lab. **Late submissions will not be accepted.**

Academic integrity: All work and grades should result from a student's own understanding and effort. Plagiarism of any kind will be reported to the Associate Dean. This includes, but is not limited to: word-for-word copying of the work of peers (this includes figures and graphs), word-for-word copying of resources and scientific journals, etc. Additionally, you are not permitted to use artificial intelligence programs to write and complete any assignments; this includes, but is not limited to, software like ChatGPT.

Acts of academic misconduct violate academic integrity, and are considered serious offenses by the University. Examples include, but are not limited to, cheating on tests or exams, plagiarizing, copying from others, falsifying lab results, etc. Instances of academic misconduct will be

reported to the Associate Dean Academic for investigation. Full details are provided in the Undergraduate Academic Calendar: https://www.uregina.ca/student/registrar/resources for-students/academic-calendars-and-schedule/undergraduate-calendar/index.html. Students are encouraged to understand your obligations as a student, as well as your rights.

Accommodations: Students in this course who may have need for specialized accommodations, should contact the Centre for Student Accessibility (Riddell Centre 229, 585-4631), and must discuss their accommodation letter with their relevant instructor.